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Hepatitis B and C viral markers in patietns with sickle cell disease in Ibadan, Nigeria

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Summary
Serum samples from 180 Sickle Cell Disease (SCD) patients attending Medical Out patients (MOP) clinic of the Department of Haematology, UCH, Ibadan, Nigeria were tested for the presence of HbsAg and anti-HCV in their blood samples. The result showed that HBV infection was slightly higher (not significant) than HCV infection among SCD patients (P>0.05). In addition, the result showed that the mean number of transfusion was higher among patients who were sero-positive for both HbsAg (5.0 ± 6.6) and anti- HCV (4.6 ± 6.7) when compared to patients who were negative for both viruses (2.7 ± 3.0 and 2.9 ± 3.2) for HBsAg and anti-HCV respectively. These observations is an indication that there is an urgent need to screen blood units for hepatitis B and C virus infections prior to transfusion in order to reduce HCV infection among SCD patients in Nigeria. Furthermore, it suggests the need to vaccinate SCD patients against HBV in this environment.

Keywords: *Hepatitis B and C, Sickle cell disease, prevalence, Blood transfusion*

Résumé
Les échantillons de serum de 180 drépanocytaires régulier a la clinique des patients general (MOP) dans le département d'hématologie, UCH, Nigéria étaient examinés pour determiner la presence d'HbsAg et l'anti-HCV dans leur échantillons de sang. Le résultat a montré qe l'infection du HBV était legérement elevé que les infections HCV parmi les drépanocytaires (P>0.005). En plus, la moyenne des cas de transfusion sanguine était plus elevé parmi les patients séro-positive au HbsAg (5.0 ± 6.6) et ceux d anti-HCV (4.6 ± 6.7) lorsque comparé aux patients negative au 2 virus (2.7 ± 3.0) et (2.9 ± 3.2) pour l'HbsAg et l'anti-HCV respectivement. Ces observations montrent des indications d'un besion urgent d' examiner le sang pour le virus de l'hepatite B et C avant la transfusion sanguine dans le but de réduire les infections du HCV parmi les drépanocytaires au Nigéria. En plus, ceci suggére la necessité de vacciner ces patients contre le virus de l'hepatite B dans cet environnement.

Introduction

Hepatitis B and Hepatitis C virus appear to be the most important hepatotropic viruses known to be transmitted percutaneously by blood and blood products. Fortunately there are established sensitive screening tests for detection of infection with both viruses.

Despite enhanced detectability for these aetiological agents and surveillance activities to reduce the viruses, they continue to constitute a threat to the health of blood recipients [1]. It is well established that hepatitis B and C viruses have overlapping epidemiological features. Although hepatitis B virus (HBV) is known to be endemic in Africa [2,3] the seroprevalence rate of hepatitis C (HCV) is yet to be well-characterized [4].

Hepatitis B surface antigen (HbsAg) in the blood remains the most useful marker of active HBV infection [5]. It appears in the blood exclusively as a component of the virion and as incomplete viral forms. The specific serological test to identify HCV infection on the other hand, is the anti-HCV antibodies (anti HCV) [6].

The viruses are of interest in patients with sickle cell disease because the health and potentiality of these patients are already compromised by their basic pathology. They are chronic blood recipients as a result of their anemia and are therefore exposed to these viruses through transfusion of blood and blood products. Infection with hepatitis viruses pose additional threat to the health of long survivors of sickle cell disease (SCD) because of progression in a proportion of hepatitis B and C infected patients to chronic liver diseased such as cirrhosis and hepatocelular carcinoma. Therefore this study was carried out to determine the relationship between hepatitis viral markers and blood transfusion in sickle cell disease patients

Subjects and methods

A total of one hundred and eighty patients aged 10 to 55 years with sickle cell disease (Homozygous Haemoglobin S and Haemoglobin S + C) were randomly selected from the Medical outpatient Clinic of Haematology Department, University College Hospital (U.C.H), Ibadan Oyo state, Nigeria. The selection of the study subjects was done irrespective of their history of blood transfusion and/or liver disease.

Control subjects were selected within the age range of study subjects from the patients attending the General out-Patients Department (GOPD).

Selection criteria for the controls were:

- -They must not have had any blood transfusion in the past.
- -No past history of hepatitis or liver disease.
- -Absence of sickle cell haemoglobinopathy.

The sickle cell disease patients included 86 males and 94 females while 42 males and 48 females were randomly selected for the controls. A self-administered questionnaire was used to collect demographic data as well as history of blood transfusion of the patients.

About 5 millilitres of blood was collected from each patient and control subjects by venepuncture. The sera from the blood samples were separated and stored at – 20 °C until tested. Each serum sample was analyzed for the presence of HbsAg and anti-HCV using commercially available Enzyme immuno assays; Monlisa HbsAg (2eme generation) and Monolisa anti-HCV (new Antigen) (Sanofi Pasteur, Paris, France) for HbsAg and anti-HCV detection respectively.

Samples were brought to room temperature prior to testing and analyzed according to the manufacturer's recommendations in the Department of Virology, College of Medicine, University of Ibadan, Nigeria.

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Results

One hundred and Eighty (180) patients with sickle cell disease attending the medical outpatients (MOP) clinic of Haematology Department for routine follow up and 90 control subjects from GOPD were recruited for the study after a verbal consent was obtained.

There were 86 males and 94 females in the study. The mean age of the patients were 23.1 ± 8 years. One hundred and forty four (144) i.e. 80% of the patients had blood transfusion in the past out of which 131 being homozygous heamoglobin (HbSS) and 13 HbSC patients.

The results showed that HBV infection was slightly higher (22.2%) than HCV infection (19.4%) among SCD patients in Ibadan (Table 1).The seropositivity for Hepatitis B virus infection in control subjects is slightly lower than in patients. In contrast, the positivity for Hepatitis C virus infection is slightly higher in control subject than in patients . However, the differences were not significant ($P > 0.05$). The dual presence of HbsAg and anti HCV indicating dual infection was observed in 13 (7.2%) patients.

Table 1: Hepatitis B virus and hepatitis C virus marker in patients and control

Status	Patients n = 180	%	Control n = 90	%	P-value
HbsAg					
Positive	40	22.2	18	20	
Negative	140	77.8	72	80	0.400
Anti-HCV					
Positive	35	19.4	19	21.1	
Negative	145	80.6	71	78.9	0.432
HBsAg/ anti-HCV					
Positive	13	7.2	5	5.6	
Negative	167	92.8	85	94.4	0.408

Socio- demographic characteristics of the patients showed that 18 (21%) of he 86 males were infected with either HBV or HCV . Out of the 94 female patients, 17 (20.2%) were seropositive for HbsAg while 13 (15.1%) were seropositive for anti HCV. The male to female ratio for HbsAg and anti- HCV were 1.2:1 and 1: 6: 1 respectively. Sero-positivity for both viral markers were highest among patients in the 20-29 years age group.

Table 2: Frequency of blood transfusion to viral markers

Frequency of blood transfussion	No. of patients n = 180		HbsAge positive n = 40		Anti-HCV positive n = 35	
	No	%	No	%	No	%
0	36	20	6	16.6	5	13.8
1	36	20	7	19.4	7	19.4
2	30	16.6	5	18.8	2	6.7
3-6	56	31.1	12	21.42	16	28.5
7-10	14	7.7	5	35.7	1	7.14
>10	8	3.8	5	62.5	4	50.0

Table II shows the frequency of blood transfusion to viral markers. The seroprevalence of HbsAg amongst the sickle cell disease patients steadily increased with increasing frequency of blood transfusion. While the seroprevalence rate for anti HCV was highest in patients who has received 3-6 units of blood and ≥ 10 units of blood.

Table 3: Correlation study on frequency of blood transfusion to viral markers.

Viral markers	Mean	SD	T-value	P-value
HBsAg				
Positive 40	5.0	6.6	3.078	0.002
Negative 140	2.7	3.0		
Anti HCV				
Positive 35	4.6	6.7	2.082	0.039
Negative 145	2.9	3.2		
HBsAg./ Anti HCV				
Positive 13	8.3	9.9	4.712	0.0001
Negative 167	2.8	3.1		

Table 3 shows the correlation study on frequency of blood transfusion to viral markers. The mean number of blood transfusion in HbsAg positive patients, (5.0 ± 6.6) is higher than (2.7 ± 3.0) for HbsAg negative patients, Similarly the mean number of blood transfusion received by anti HCV patients, (4.6 ± 6.7) was more than that received by patients who were seronegative for anti HCV (2.9 ± 3.2).

Discussion

Viral hepatitis is a major health problem whose epidemiology has not been determined especially as it continues to constitute a threat to life of infected persons. Hepatitis B and C viruses are particularly unique due to their ability to cause persistent infection in chronic carriers and progressively cause terminal liver disease [7]. Epidemiological stratification have shown that Nigeria belongs to the high endemicity zone with a carrier rate in the range of 8-22% [8,9] with an estimated exposure rate of up to 70 % [10].

Sickle cell disease patients being blood recipients are considered to be among the high-risk population groups for hepatitis virus infection. However the sero-prevalence of 22% found among the patients in this study is similar to the rate that has been reported in the general population in Nigeria. This may be a reflection of the adequacy of the blood transfusion services with respect to screening for hepatitis B virus infection in the blood units. Horizontal transmission [11], which is responsible for maintaining the endemicity of the virus in high endemic regions may have a role to play in these patients.

The sero prevalence of 19.4% obtained for anti-HCV in the SCD patients and 21.1% in control subjects is higher than the previously reported rate of about 6% sero-prevalence in some African general population [1,11,12]. Although the sero-prevalence rate found in this study is consistent with that in SCD patients in Benin [3], it is however higher than 16% found among sickle cell disease patients in Saudi Arabia [13] and 10.1% among those in New York [14] The higher sero-prevalence rate among the males is similar to what has been reported from some developed countries [11,15].

The highest prevalence of both HbsAg and anti HCV found among patients 20-29 years age group may be due to continued exposure to infected blood over time as well as the possibility of horizontal transmission of both viruses in childhood and adolescent stages in highly endemic areas like Nigeria. It is known that older SCD patient have increasing need for blood transfusion [3].

It is evident from the results of this study that the role of blood transfusion in the transmission of hepatitis B and C viruses can be enhanced with increasing frequency of blood transfusion. The patents that were negative for both viral markers had less than 3 units of blood. This is consistent with previous report from Benin [3]. A higher rate of HCV infection than HBV among our study population is not surprising because testing for the former was not carried out in our blood bank until recently. The implication of transfusing blood units that are not screened for hepatitis C virus can be grave in long survivors of sickle cell disease who are likely to receive far more units of blood in their life time. As blood remains a reservoir for HCV infection, transfusion of unscreened units of blood constitute an additional risk to SCD patients.

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